DigiGait - Gait Analysis System for laboratory animals

High-Performance Digital Imaging System

for spatial and temporal indices of gait
at adjustable walking speed and belt
inclination.

The instrument is completely turnkey with acquisition and analysis software for accurate assessment of treadmill and over ground locomotion.

Applications:

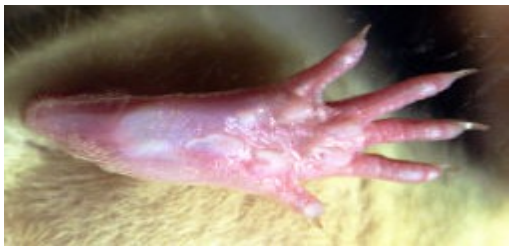
- Arthritis
- Neurodegeneration
- Neuropathy
- Pain
- Parkinson's Disease
- Spinal Cord Injury
- Huntington's Disease
- Aging
- Lysosomal Storage Disease
- Drug Toxicity
- Amyotrophic Lateral Sclerosis (ALS)

Features of DigiGait™, the Patented Treadmill

Walking Compartments for Mice and Rats

The walking compartments are easily inter-changeable to evaluate gait in small and large animals. Each compartment is constructed of clear polycarbonate with adjustable front and rear walls. Wall locations are adjustable for a lane length of 3.0" (7.6 cm) for neonatal mice, to 24" (61 cm) for large rats and guinea pigs. The compartments are interchangeable in less than one minute

Crystal Clear Walking Surface

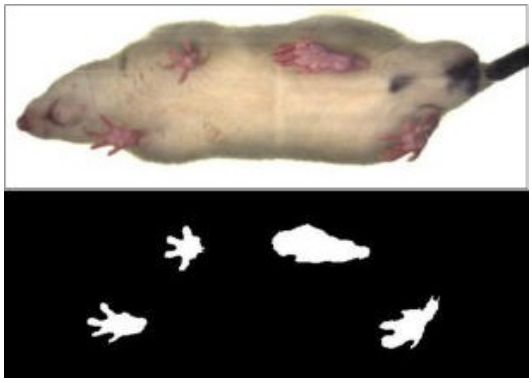


The **DigiGait™** treadmill belt is a clear, easily cleaned polymer bonded endless loop. The material provides excellent traction at walking and high running speeds. The transparent treadmill belt maximizes the efficiency of the camera and image processing software to identify paw contact with the treadmill surface at all walking and running speeds.

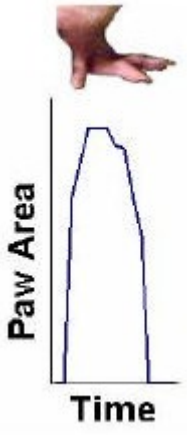
Widely Applicable

- Gait dynamics in mice, rats, and guinea pigs
- Treadmill and over ground locomotion
- Analysis of coordination
- Walking and running
- Horizontal and incline
- Multiple Speeds

DigiGait™ Imaging System Description



DigiGait™ performs ventral plane videography of rodents walking on a motorized transparent treadmill belt. A high-speed digital video camera continuously images the underside of the walking animals. **DigiGait™** software generates "digital paw prints" and dynamic gait signals, representing the temporal record of paw placement relative to the treadmill belt. The gait signal of each limb comprises the stride duration, which includes the stance duration when the paw of a limb is in contact with the walking surface, plus the swing duration when the paw of the same limb is not in contact with the walking surface. Stance duration is subdivided into braking duration (increasing paw contact area over time) and propulsion duration (decreasing paw contact area over time). More than thirty-five gait indices are reported, including the sciatic functional index (SFI), stance factor, and the step-sequence pattern.



DigiGait™ is delivered and installed completely, including the now patented treadmill with the transparent treadmill belt, digital imaging hardware and software, high-intensity no-flicker lighting, and walking compartments for mice and rats. The incline of **DigiGait™** is fixed at horizontal, but can be tilted for uphill or downhill walking. Belt speed is adjustable over the range of 0 to 99.9 cm/s with 0.1 cm/s resolution. The option to control walking speed improves reliability and reproducibility of gait indices.

High-torque Motor with Speed Control

DigiGait™ is controlled by a DC-motor with no variability induced by alternating currents. The treadmill belt speed is variable from 0 to 99.9 cm/s. The speed display in cm/s provides a precise range of walking speeds. The motor driven treadmill belt ensures that a sufficient number of strides are obtained at desired walking or running speeds.

Material Specification

The animal contacts PVC and polycarbonate material when walking within the treadmill compartment. The compartments are transparent to continuously monitor the animal from multiple angles. The treadmill housing is manufactured from non-corroding aluminum. Industrial castor wheels facilitate transfer between laboratories.

Electrical Specifications

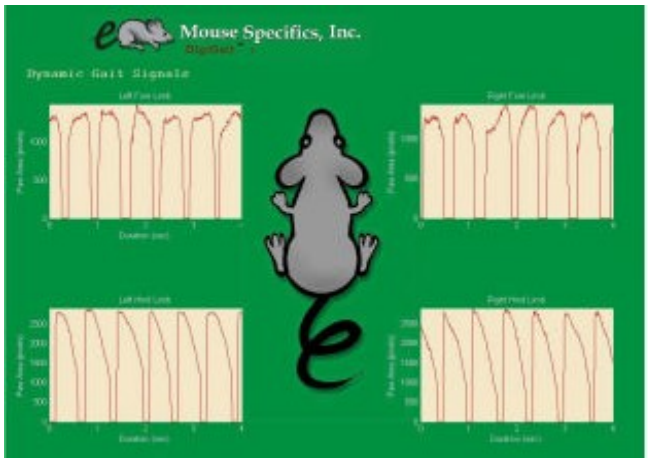
Available in: 115VAC/60Hz & 230V/50Hz
Treadmill motor: DC, ¼ HP; Torque: 45 lb–in
Speed: 100.0 cm/s, adjustable with digital display.
Lighting: 90-250 VAC, 25 kHz, 5000K color temperature

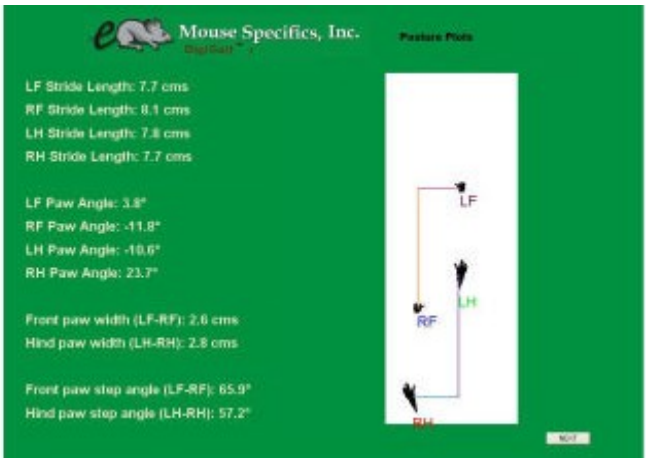
Physical Specifications

Overall height: 36" (92 cm)
Overall width: 36" (92 cm)
Overall depth: 9" (23 cm)

DigiGait™ Imaging and Analysis Software

Included imaging and analysis software AUTOMATICALLY quantifies spatial and temporal indices of gait in walking or running animals. No markers are used. Unlike other video tracking software, the user is not required to manually outline or identify the regions of interest. Rather, one graphical user interface empowers the user to maximize the contrast between the animals' paws and the background, enabling the study of mice, rats and guinea pigs of any strain and coat color. Paw placement of each limb is identified throughout the gait cycle at up to 150 frames per second. Outputs of the analysis are dynamic gait signals for each limb and a plot of the animal's posture. More than 35 gait indices are reported in spreadsheet-ready format, including stance, swing, braking, propulsion, cadence, step sequence, regularity index, and the sciatic functional index.





	A	B	C	D	E	F	G	H	I	J	K	L	M
1	FileName	Limb	Swing	%SwingStride	Brake	%BrakeStride	Propel	%PropelStride	Stance	%StanceStride	Stride	%BrakeStance	%PropelStance
2			(s)	(%)	(s)	(%)	(s)	(%)	(s)	(%)	(s)	(%)	(%)
3	october8_ba	Left Fore	0.098	34.9	0.064	22.8	0.118	42.3	0.182	65.1	0.279	35.1	64.9
4	october8_ba	Right Fore	0.097	34.9	0.064	23.2	0.116	41.8	0.18	65.1	0.277	35.7	64.3
5	october8_ba	Left Hind	0.066	23.3	0.045	15.9	0.172	60.8	0.217	76.7	0.283	20.7	79.3
6	october8_ba	Right Hind	0.061	21.6	0.029	10.1	0.193	68.3	0.221	78.4	0.282	12.9	87.1
7	october_8_a	Left Fore	0.079	44.6	0.028	16	0.07	39.5	0.098	55.4	0.176	28.8	71.2
8	october_8_a	Right Fore	0.089	40	0.041	18.5	0.092	41.5	0.134	60	0.223	30.8	69.2
9	october_8_a	Left Hind	0.067	26.7	0.024	9.4	0.16	63.9	0.183	73.3	0.25	12.8	87.2
10	october_8_a	Right Hind	0.091	37	0.017	6.7	0.139	56.3	0.155	63	0.247	10.6	89.4

Selected Publications

The **DigiGait™** technology has been described in numerous publications, including:

1. Regulation of parkinsonian motor behaviors by optogenetic control of basal ganglia circuitry. Nature. 2010; 466(7306): 622-626
2. Characterization of early pathogenesis in the $SOD1^{G93A}$ mouse model of ALS: part II, results and discussion. Brain and Behavior. 2013; 3(4): 431-457
3. Age decreases macrophage IL-10 expression: Implications for functional recovery and tissue repair in spinal cord injury. Exp Neurol. 2015; 273: 83-91